



MINISTERIE VAN ECONOMISCHE ZAKEN

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De Minister van Economische Zaken,

Gelet op de wet van 28 Maart 1984 op de uitvindingsoctrooien
inzonderheid artikel 22;
Gelet op het Koninklijk Besluit van 2 December 1986, betreffende het aanvragen,
verlenen en in stand houden van uitvindingsoctrooien, inzonderheid artikel 28;
Gelet op het proces-verbaal opgesteld door de Dienst voor Industriële Eigendom op
30 Januari 1997 te 10u15

BESLUIT :

ARTIKEL 1.- Er wordt toegekend aan : MEURA-DELTA, naamloze vennootschap
Arenbergstraat 23, B-2000 ANTWERPEN(BELGIE)

vertegenwoordigd door : DONNE Eddy, BUREAU M.F.J. BOCKSTAEL, Arenbergstraat, 13 - B
2000 ANTWERPEN.

een uitvindingsoctrooi voor de duur van 20 jaar, onder voorbehoud van de betaling van
de jaartaksen voor : WERKWIJZE EN INRICHTING VOOR HET OXIGENEREN VAN GIST.

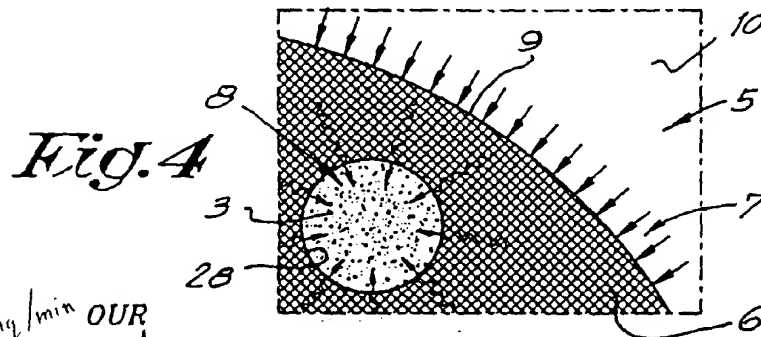
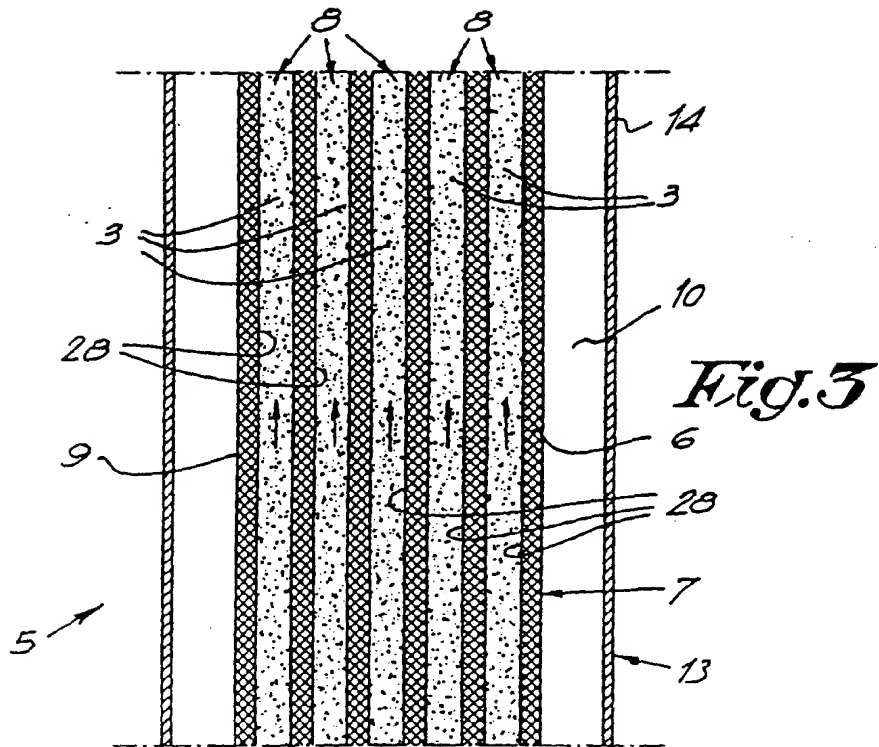
UITVINDER(S) : Andries Marc, Schoolstraat 20, B-3380 GLABBEK (BE); Van Beveren P.C.,
Ossendrechtseweg 91, NL-4631 BB Hoogerheide (NL)

ARTIKEL 2.- Dit octrooi is toegekend zonder voorafgaand onderzoek van zijn
octrooieerbaarheid, zonder waarborg voor zijn waarde of van de juistheid van
de beschrijving der uitvinding en op eigen risico van de aanvrager(s).

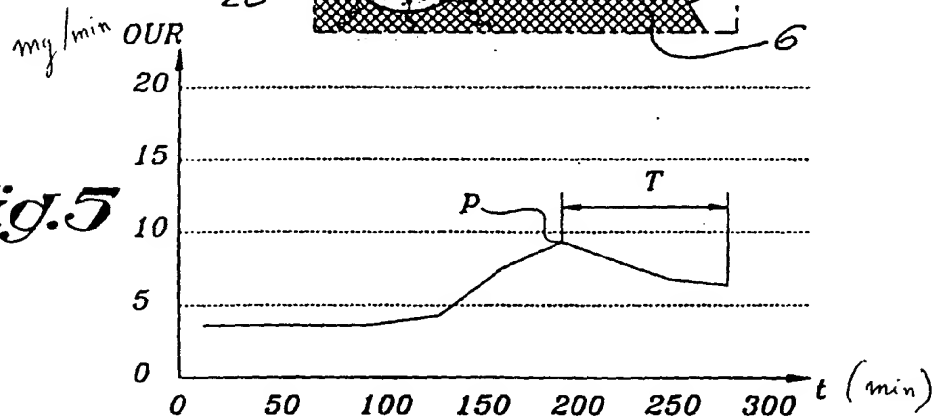
Brussel 02 Februari 1999
BIJ SPECIALE MACHTIGING :


L. WUYTS
ADVISEUR

- 15 -



15°C
60g yeast/liter

Fig. 5

3 ft 1 in³ diameter
19 elements
14.9 ft² total area

Huige, Nick

From: Huige, Nick
Sent: Sunday, June 20, 1999 11:05 AM
To: Barney, Michael; Fehring, Jeff; Pugh, Tom; Navarro, Alfonso; Tata, Murthy
Cc: Ryder, David
Subject: Meura Delta Yeast Oxygenation Patent

This patent that we briefly discussed in our Emerging Fermentation meeting this morning was issued on 2/12/99 in Belgium. Since it is in Dutch, I will translate the claims and send you the cover sheet and the drawings by mail. Note that these claims are very broad.

Claims:

1. Procedure for oxygenating yeast, to which oxygen is added, either in pure form or in a dissolved state, in which the addition of oxygen is accomplished by distributing the oxygen into the yeast suspension (3) via a porous membrane structure (6).
2. Procedure according to claim 1, in which a rigid membrane structure (6) is used along which yeast (3) is pumped, while oxygen at an elevated pressure is applied to another part of the membrane surface (6).
3. Procedure according to claims 1 or 2, in which the yeast suspension (3) is recirculated via loop (4), which may for example be parallel to tank (2) which contains yeast suspension (3), and in which the oxygen is supplied to yeast suspension (3) by means of the porous membrane structure (6), placed in the recirculation loop (4).
4. Procedure according to claim 3, in which a membrane system (6) is used which consists of a body (7) of porous material, which has flow channels (8) for the yeast suspension (3), while oxygen under pressure is supplied on the outside (9) of body (7).
5. Procedure according to claims 3 or 4, in which the flow rate of the yeast suspension (3) is optimized by means of a once applied control mechanism.
6. Procedure according to any of the previous claims in which the oxygen supply is controlled.
7. Procedure according to claim 6 in which the oxygen supply is controlled as a function of oxygen concentration measurements.
8. Procedure according to claim 7, in which the oxygen uptake capacity of the yeast is measured over time, and in which a given time increment (T) is used after the time at which the OUR reaches a maximum value (P).
9. Procedure according to claim 8, in which the time increment (T) is about 2 hours.
10. Procedure according to any of the previous claims, in which a yeast suspension is used with a concentration of at least 30 gram per liter.
11. Procedure according to any of the previous conclusions, in which the yeast suspension (3) is cooled to maintain a temperature of about 15 deg.C.
12. Procedure according to any of the previous claims, in which the membrane structure (6) consists of aluminum oxide.
13. Installation to accomplish the procedure of any of the previous claims, which mainly consists of a porous membrane structure (6) through which oxygen can be supplied to yeast suspension (3).
14. Installation according to claim 13, which mainly consists of a tank (2) to contain the yeast suspension (3) that needs to be oxygenated and a recirculation loop (4) which is connected to tank (2) and which contains an oxygen delivery system with the membrane structure.
15. Installation according to claims 14, in which the membrane structure consists of a body (7) of porous material with flow channels (8) for the yeast suspension (3), while a chamber (10) for the supply of oxygen under pressure is on the outside (9) of body (7).
16. Installation according to claim 15, in which the membrane structure (6) has one, or a combination of 2 or more of the following characteristics:
 - a body (7) in the shape of a tube which contains flow channels (8) in the parallel direction;
 - a body (7) which is 80 to 100 cm long with a diameter of 2 to 3 cm, while this body contains 15 to 25 channels with a diameter of 2 to 3 mm;
 - that the pores are in the order of magnitude of 0.02 to 0.2 microns.
17. Installation according to claims 14 to 16, in which the exit (17) of the recirculation loop (4) is positioned at the bottom of

17. Installation according to claim 17, in which the exit of recirculation loop (4) is at the top of tank (2); that a pump (20) is mounted in recirculation loop (4) in the flow direction through membrane structure (6); and that membrane structure (6) has flow channels (8) for the yeast suspension (3) that are vertically extended.

18. Installation according to claim 17, in which a measurement device (24) is mounted between tank (2) and oxygen supply system (5) to measure OUR; that the oxygen is supplied via a control valve (22) that is mounted between the pressurized oxygen source (12) and the oxygen supply system (5); and that it contains a control device (23) which controls the setting of the control valve (22) as a function of the output of the measuring device (24).